

AMENDMENTS TO THE CLAIMS

Claims 1-35 (cancelled).

36. (new) A method of using a hydrogen containing gas as a fuel, a component of a fuel or a fuel additive in hydrogen assisted combustion within a compression engine comprising the steps of

admitting materials for making the hydrogen containing gas to a hydrogen generator,

producing the hydrogen containing gas as a gas blend or gas mixture using the hydrocarbon generator in which the gas blend or gas mixture contains hydrogen gas together with at least one other gaseous component,

reducing the temperature of the gas blend or gas mixture by passing the gas blend or mixture through a heat exchanger to form a cooled gas blend or gas mixture,

introducing the cooled gas blend or gas mixture into the compression engine,

introducing another fuel component into the engine, said other fuel component being essentially a hydrocarbon or hydrocarbon containing fuel to form the fuel for the engine,

combusting the fuel within the engine to form exhaust gases, and

passing the exhaust gases through another heat exchanger to extract heat from the exhaust gases to heat at least one of the materials being introduced into the hydrogen generator for forming the hydrogen containing gas wherein the relative amounts of the hydrogen and the at least one other gaseous component of the gas blend or mixture are selected in accordance with the nature of the at least one other gaseous component and the requirements for the hydrogen assisted combustion.

37. (new) A method of operating a hydrogen generator to produce a hydrogen containing gas or a gas blend or gas mixture for use as a fuel, a fuel component or a fuel additive in which the gas blend or gas mixture contains hydrogen and at least one other gaseous component, comprising,

admitting materials for making the gas blend or gas mixture to the hydrogen generator,

adjusting the operating parameters of the hydrogen generator to provide a preselected composition of the gas blend or gas mixture suitable for use in hydrogen assisted combustion within the compression engine,

operating the hydrogen generator to produce the gas blend or gas mixture,

and discharging the gas blend or gas mixture from the hydrogen generator for admission into the compression engine,

wherein the relative amounts of the hydrogen and the at least one other gaseous component of the gas blend or gas mixture are selected in accordance with the nature of the at least one other

gaseous component and the requirements for hydrogen assisted combustion.

38. (new) A method of operating a compression engine using hydrogen assisted combustion comprising the steps of

producing a hydrogen containing gas comprising hydrogen together with at least one other gaseous component in the form of a gas blend or gas mixture,

cooling the gas blend or gas mixture by passing the gas blend or gas mixture through a heat exchanger to form a cooled gas blend or gas mixture,

introducing the cooled gas blend or gas mixture into the compression engine as at least one component of fuel for the engine, introducing another component of the fuel into the engine, said other component being a hydrocarbon or hydrocarbon containing fuel component,

combusting the fuel in the engine to form exhaust gas,

passing the exhaust gas through a heat exchanger to extract heat from the exhaust gas to heat for heating the material from which the gas blend or gas mixture is produced

wherein the relative amounts of the hydrogen and the at least one other gaseous component of the gas blend or gas mixture are selected in accordance with the nature of the at least one other gaseous component and the requirements for hydrogen assisted combustion.

39. (new) A method according to claim 36 in which the at least one other gaseous component of the gas blend or gas mixture produced by the hydrogen generator does not require removal from the gas blend or gas mixture prior to combustion of the fuel in a compression engine using hydrogen assisted combustion.

40. (New) A method according to claim 36 wherein the at least one other gaseous component is selected from the group consisting of: oxygen, nitrogen, water, ethanol, carbon dioxide, carbon monoxide, hydrocarbons, methanol, methane or combinations thereof.

41. (New) A method according to claim 36 in which hydrocarbon material is produced in the hydrogen generator along with the hydrogen and the other gaseous component or components.

42. (New) a method according to claim 41 in which the hydrocarbon material is a paraffin or paraffin-like hydrocarbon containing saturated bonds.

43. (New) A method according to claim 42 in which the hydrocarbon is a C₁-C₂₀ hydrocarbon or a combination thereof.

44. (new) A method according to claim 40 in which the material for making the hydrogen containing gas is a fuel material including diesel, petrol, gasoline or canola oil.

45. (New) A method according to claim 36 including the step of adjusting operating parameters of the hydrogen generator to produce a desired ratio of hydrogen to the at least one other component in the gas mixture or blend.

46. (new) A method according to claim 45 in which the operating parameters include one or more of the following, the composition of the materials introduced to the hydrogen generator for forming the gas blend or mixture, the velocities of gases of the various components, the temperature of operation of the hydrogen generator, the pressure of operation of the hydrogen generator, the velocity of gas being passed through the generator, the catalyst being used in the generator, the amount of exposure of the materials in the reactor to the catalyst, the type of hydrogen generator used, the nature and composition of the other component or components produced simultaneously with the hydrogen, the amount of cooling of the gas blend before it is introduced into the engine, and the temperature of the material for producing the gas blend or gas mixture introduced into the reactor.

47. (New) A method according to claim 46 in which the hydrogen generator is operated at a pressure of from about 1-5 bar.

48. (New) a method according to claim 46 in which the catalyst used in the hydrogen generator is selected from the group consisting of: nickel, platinum, materials containing nickel or platinum or combinations thereof.

49. (New) A method according to claim 36 in which the cooled gas mixture or blend is added directly to the engine or indirectly to the engine after cooling.

50. (New) A method according to claim 49 in which the cooled gas mixture or blend is added to a mixing chamber prior to being introduced into the engine.

51. (New) a method according to claim 36 in which the gas blend or mixture is added in combination with one or more other components of the fuel for the engine.

52. (New) A method according to claim 36 in which the other fuel component for the compression engine is introduced to the engine separately from the hydrogen containing gas blend or mixture required for hydrogen assisted combustion.

53. (new) A fuel system for a compression engine comprising a hydrogen generator for generating a hydrogen containing gas including hydrogen and at least one other component in the form of a gas blend or mixture at a first temperature, a heat exchanger for reducing the temperature of the hydrogen gas blend or mixture from the first temperature to a second temperature by passing the gas blend or mixture through the heat exchanger prior to introducing the gas blend to the engine wherein the gas blend forms one component of the fuel for the engine and wherein the relative amounts of the hydrogen and of the at least one other material of the gas blend or mixture are selected in accordance with the nature of the at least one other material and the requirements of hydrogen assisted combustion within the engine.

54.(new) The system of claim 53 in which the hydrogen generator is selected from the group consisting of: an electrolysis apparatus, a fuel cell, a fuel processor, a reformer, a cold fusion apparatus or other apparatus for producing hydrogen along with one or more other materials.

55. (New) A method according to claim 54 in which the hydrogen generator is a reformer operated at a temperature of from 100°C.-1000°C.

56. (New) The system of claim 54 in which the fuel cell is selected from the group consisting of: a proton exchange fuel cell, a solid oxide fuel cell, an alkaline fuel cell, a direct methanol fuel cell, a molten carbonate fuel cell, a phosphoric acid fuel cell or a regenerative fuel cell.

57. (new) The system of claim 54 in which the hydrogen generator is a reformer in which steam is used to heat a fuel as it passes over a catalyst provided in the hydrogen generator to produce the hydrogen together with the at least one other material to form the gas blend or mixture in the form of a reformate gas.

58. (New) The system of claim 57 in which the fuel and steam are cracked by passage through the hydrogen generator to form the reformate gas or hydrogen containing gas blend or mixture.

59. (New) The system of claim 57 in which the reformer reforms a hydrocarbon fuel

including petrol, diesel or gasoline to the reformate gas or hydrogen containing gas blend or mixture with the aid of steam.

60. (New) The system of claim 53 in which the compression engine is a diesel engine.

61. (New) The system of claim 53 further including one or more heat exchangers to cool the gas blend or mixture prior to introduction into the engine or to cool the gas being recycled to the hydrogen generator.

62. (New) The system of claim 53 characterised in that the fuel is diesel fuel, petrol, gasoline or kerosene.

63. (new) A hydrogen containing gas blend or mix suitable for use as a fuel or fuel additive or one component of a fuel characterised in that the gas blend or mix contains hydrogen and at least one other component in addition to hydrogen in which the other component is produced substantially simultaneously with the hydrogen by a hydrogen generator in which the relative amounts of the hydrogen and the other component is selected in accordance with the nature of the other component and the requirements of the engine for hydrogen assisted combustion within an engine to which the gas blend or mix is introduced.

64. (new) The gas blend of claim 63 in which the hydrogen gas blend or mixture produced by the hydrogen generator contains from about 0-50% by volume of hydrogen.

65. (New) The gas blend of claim 63 in which the gas blend or mixture includes from about 0-25% by volume of carbon monoxide.

66. (New) The gas blend of claim 63 in which the gas blend or mixture includes up to about 5% by volume hydrocarbon material.

67. (New) The gas blend of claim 63 characterised in that the amount of carbon dioxide contained in the gas mix or blend is up to about 25% by volume.

68. (New) The gas blend of claim 63 characterized in that the gas blend or mixture contains the balance of nitrogen.